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September 17, 2015

Gary Miller, Remedial Project Manager
U.S. Environmental Protection Agency, Region 6
Superfund Division (6SF-RA)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Re: San Jacinto River Waste Pits Superfund Site U.S. Army Corps of Engineers Feasibility Study Review

Dear Mr. Miller:

This letter provides comments on the *Evaluation of the San Jacinto Waste Pits Feasibility Study Remediation Alternatives* (U.S. Army Corps of Engineers (USACE) August 2015) (USACE Report). It is submitted on behalf of the Respondents, International Paper Company (IP) and McGinnes Industrial Maintenance Corporation (MIMC), named in the Unilateral Administrative Order (UAO) for the Remedial Investigation/Feasibility Study (RI/FS) at the San Jacinto River Waste Pits Superfund Site (Site) in Channelview, Texas (U.S. Environmental Protection Agency Region 6 (USEPA), CERCLA Docket No. 06-03-10 UAO for RI/FS).

Based on a discussion with you in our meeting on September 2, 2015, our understanding is that the USEPA intends to use the USACE Report as a basis for preparing final comments on the Draft Final Interim Feasibility Study Report (FS) for the Site (Anchor QEA 2014). Respondents request that, in preparing final comments on the Draft Final Interim FS, USEPA consider the Respondents' comments regarding the USACE Report set forth below.

Overall, Respondents support the conclusions brought forward and stated in the Executive Summary of the USACE Report evaluating the remedial alternatives presented in the Draft Final Interim FS. Respondents do not, however, concur regarding the appropriateness of, or

the method used in developing, the "clean up" level under Task 20. Respondents also have comments regarding aspects of the USACE's analysis and certain statements contained in the main body of the USACE Report.

USACE's Evaluation of Remedial Alternatives

The USACE performed "evaluations to address the permanence of the existing repaired Time Critical Removal Action (TCRA) cap with the proposed modifications outlined in the capping Alternative 3N of the Draft Final Interim FS." USACE Report at Executive Summary (ES)-1. It concluded that the TCRA armored cap, with the enhancements included in Alternative 3N, "is expected to be stable and permanent, requiring only maintenance or repair following unusual catastrophic events." *Id.* at ES-1. The USACE also concluded the armored cap as enhanced (Alternative 3N) is predicted to have long-term reliability in withstanding scour-related processes, and that the slope improvements proposed as part of Alternative 3N will provide the USACE-recommended factor of safety for slope stability. *Id.* at ES-1.

With respect to barge strikes (one of the potential "unusual catastrophic events" evaluated by the USACE), the USACE concluded there is a "low probability of barge strikes that would impact the integrity of the cap." *Id.* at ES-1. The USACE also noted that potential impacts from barge strikes could be avoided by constructing pilings around the TCRA armored cap. *Id.* at 54. Alternative 3N includes construction of an underwater berm around the TCRA armored cap that would serve the same function as the pilings.[1]

The USACE also noted that a geomembrane or geotextile filter is present in all areas except in the deeper waters where a blended filter media was incorporated with the armor cap material as in the Northwestern Area. *Id.* at ES-2. Respondents support the USACE's suggestion that the blended filter and cap construction in the more steeply sloped areas should be examined to confirm that the cap elements are continuing to provide isolation of the sediment from bioturbators.

Finally, the USACE performed evaluations to assess the effectiveness of the existing repaired TCRA armored cap with the proposed modifications outlined in capping Alternative 3N and

[1] USACE's evaluation of barge strikes does not appear to have considered the impact of the underwater berm proposed as part of Alternative 3N in assessing the potential for such strikes to occur.

showed that the cap is expected to be "highly effective." *Id.* at ES-2. The USACE also concluded that any resuspension and releases from capping will be very small compared with those associated with the removal alternatives and that the armored cap effectively controls bioaccumulation. *Id.* at ES-2.

USACE's Review of Cleanup Level

The USACE Report also included, as part of Task 20, a "review of the cleanup level." *Id.* at ES 3-4, 164-168. Respondents do not support the "sediment remediation action level" of 114 ng/kg sediment $TEQ_{DF,M}$ presented in the Executive Summary and derived under Task 20 as a "protective concentration level" (PCL) for sediment.

Sediment PCLs for both subsistence fishers and child recreational fishers are presented in the USACE Report's discussion of Task 20. The PCLs derived under Task 20 are not appropriate to this Site because they address hypothetical future exposure scenarios that USEPA has previously acknowledged are not reasonably anticipated for areas within the USEPA's preliminary site perimeter, and in particular in the vicinity of the impoundments north of I-10 where a commercial worker use scenario would apply. Respondents also view the technical approach used to derive these PCLs to be flawed because of the method used to derive a biota-sediment accumulation factor (BSAF). In addition, the USACE ignored Site-specific BSAFs that were already developed by Respondents at USEPA's request and were presented in Appendix B of the Remedial Investigation (RI) Report (Integral and Anchor QEA 2013).

The sediment PCLs presented by USACE are based on hypothetical future uses by a child recreational fisher and subsistence fisher. The baseline risk assessment for these hypothetical exposure scenarios presented in the Baseline Human Health Risk Assessment were conducted on the basis of "fish collection areas" (FCAs), for reasons described in the Exposure Assessment Memorandum (Integral 2012). Risk management, including any PCLs developed for the USEPA's preliminary site perimeter, should similarly recognize this spatial framework based on FCAs, but the work performed by USACE does not. Concentrations of $TEQ_{DF,M}$ in surface sediment outside of the central portion of the area within the USEPA's preliminary site perimeter, or SJFCA2 (RI Report Figure 2-6), are below 100 ng/kg (RI Report Figure 5-4a). The referenced figures from the RI Report are attached. Within

SJFCA2, neither subsistence fishing nor recreational fishing are reasonably anticipated future uses because there is ongoing industrial activity there, and the barge fleeting operation is expected to deter use of the TCRA armored cap for recreation and fishing. Moreover, institutional controls implemented as part of the TCRA prevent access to areas in the vicinity of the northern impoundments. For these reasons, and on the basis of communications with USEPA in 2013, the reasonably anticipated future use for the area of the impoundment north of I-10 and elsewhere in SJFCA2 is commercial. Therefore, the sediment PCL for a commercial worker of 220 ng/kg that was used in preparing the Draft Final Interim FS was appropriate and should continue to form the basis for evaluation of remedial alternatives.

The method used to derive PCLs for sediment under Task 20 was flawed because of the way in which USACE calculated the BSAF. In general, the BSAF is calculated by dividing a biological tissue (e.g., edible fish tissue) concentration by the concentration of the same chemical in sediments from the area where the organism was exposed (USEPA 2009). To determine a PCL for sediment, a safe concentration in edible fish tissue (for a given exposure scenario) is divided by the BSAF to estimate the corresponding safe concentration in sediment, or sediment PCL. In the USACE's calculation of the BSAF, USACE first subtracted the background concentration in sediment from their selected mean pre-TCRA sediment concentration, and subtracted the concentration in background fish tissue from the site-wide average edible catfish tissue concentration. After performing these operations, they used the remainder values to calculate the BSAF that was then used to calculate sediment PCLs for scenarios that include fish ingestion. This approach, involving the subtraction of background concentrations before calculating a BSAF, is not consistent with USEPA guidance and does not make sense conceptually. According to USEPA (2009), the BSAF should be calculated using data for tissue and sediment collected from the same area; the BSAF method assumes that a fish captured on a site is exposed to the sediment present on that site, regardless of concentrations in background sediments. As a result, the PCLs developed by the USACE are not valid and result in a PCL lower than would be the case if the calculation was properly performed. The BSAF and PCLs calculated by USACE should not be considered by USEPA in developing its final comments on the Draft Final Interim FS.

Respondents have previously addressed with USEPA the reasons why they do not consider the BSAF to be an appropriate tool for predicting dioxins and furans in fish and crab tissue (Integral 2010). Nonetheless, at USEPA's direction and in response to USEPA comments on

the Preliminary Site Characterization Report (Integral and Anchor QEA 2011), Site-specific BSAFs were calculated as part of the remedial investigation (RI), and are presented in detail in Appendix B of the RI Report (Integral and Anchor QEA 2013). With this information available, USEPA (2009) establishes a more conventional and appropriate approach to using a BSAF: use the mean Site-specific BSAF for 2,3,7,8-TCDD in catfish from SJFCA2, as presented in Appendix B (0.0229 kg sediment/kg tissue), to estimate a PCL for $TEQ_{DF,M}$ in sediments in the same area. This approach is not only consistent with guidance but is conservative because it assumes all congeners bioaccumulate to the same extent as 2,3,7,8-TCDD, the most bioaccumulative of the 17 dioxin and furan congeners in edible catfish tissue (RI Report, Appendix B, Table B-4). Using the Site-specific BSAF for 2,3,7,8-TCDD in SJFCA2, and the PCL for edible catfish cited by USACE (3.8 ng/kg; RI Report Table 5-33), the resulting sediment PCL for the hypothetical child recreational fisher scenario would be 166 ng/kg $TEQ_{DF,M}$.

Comments on Other Aspects of the USACE Report

Respondents have identified a few technical details and statements within the main body of the USACE Report that require clarification. Those details and statements fall within two general categories, one related to the armored cap engineering design and the second related to hydrodynamic, sediment transport and chemical fate and transport modeling.

With regard to the armored cap engineering design:

- The USACE recommends the potential addition of a carbon amendment, such as AquaGate or SediMite to the armored cap in the Eastern Cell and Northwestern Area to further reduce the potential for contaminant losses from diffusion. The basis for this recommendation is that no geomembrane was placed in those areas. However, no analysis of transport was conducted by the USACE to specifically quantify and verify the need for a carbon amendment. Further evaluation of this transport pathway is currently being planned with USEPA. Any consideration of this recommendation should be deferred until that additional evaluation has been completed.
- The USACE Report also evaluates the potential impact of toe erosion and cap undermining, and the potential impact of storm surges. The current armored cap includes a thickened edge that is designed to minimize the potential risk of toe erosion and cap undermining. Enhancements to the thickened edge are included in

Alternative 3N (Figure 1). The recommendations presented by the USACE would further improve the performance of the edge. In regards to the potential impacts of storm surges, it should be noted the TCRA armored cap was designed to resist the worst case erosion resulting from a range of storm conditions, and was evaluated to demonstrate that the cap armor will not erode during storms up to and including a 500-year recurrence interval event.

- Task 13 of the USACE Report addresses statements in the Draft Final Interim FS regarding releases associated with Alternative 4N, described by USACE as the "remedial alternative with removal, solidification, and placing waste again beneath the TCRA cap." *Id.* at 133-141. The USACE Report states that "the short-term effectiveness of Alternative 4N is significantly under predicted, unless losses are predicted only from solidification operations in the wet…." To clarify, for purposes of Alternative 4N, losses were predicted only from the "solidification operations in the wet." Losses from the Western Cell were assumed to be zero (see Table 1 summarizing the modeling assumptions for each alternative in the Draft Final Interim FS). Losses for Alternative 4N were only modeled for stabilization in the Eastern Cell, behind the sheet-pile wall. Thus, short-term effectiveness for Alternative 4N was not underpredicted in the Draft Final Interim FS.
- In connection with Task 13, USACE also stated that "…the long-term effectiveness of Alternative 4N is significantly under predicted and should be comparable to Alternative 3N." The USACE devoted extensive efforts to developing an estimate of contaminant releases associated with the various remedial alternatives, including the various incremental processes that contribute to the releases (sheetpile construction, dredging, etc.). The results of the USACE's efforts showed the estimated percentage of contaminant loss was 1% to 4% (depending on the specific type of Best Management Practices (BMPs) used to minimize releases; see Table 11-20. *Id.* at 90. The USACE's results are consistent with the assumed 3% release rate used for chemical fate and transport model simulations of sediment removal under Alternatives 5N and 6N in the Draft Final Interim FS, as well as the 0.85% release rate assumed for solidification/stabilization activities performed in the wet with sheetpile associated with Alternative 4N. Thus, long-term effectiveness of Alternative 4N is not under-predicted in the Draft Final Interim FS. As presented in the Draft Final Interim FS, because Alternative 4N includes release of chemicals associated with solidification/stabilization activities, its long-term protectiveness is less than that predicted for Alternative 3N, which would not include such releases
- The USACE Report also states that "[s]ince both [alternatives 4N and 5N] are addressing the same area and mass of sediment, and similarly disturbing the

sediments, one would expect similar losses and impacts to the water column." *Id.* at 138. This comment does not take into account that different BMPs were assumed for 4N and 5N, and these different assumptions resulted in different losses. Please see Table 1 for a description of the modeling scenarios in the Draft Final Interim FS.

In regards to the hydrodynamic, sediment transport and chemical fate and transport modeling: following are points that either require clarification or as to which Respondents disagree with the USACE's assertions:

- After completing its own evaluations of the model, the USACE concluded that the Anchor QEA model set up and boundary conditions were satisfactory. For example, the USACE initially had concerns about the data source chosen by Anchor QEA for the water surface elevation (WSE); however, the USACE's sensitivity results presented on page 26 state that the USACE "…comparison quantified that the location of Anchor QEA's boundary was located sufficiently far from the San Jacinto River Site so as to not impact the results of either [the] sediment transport model or contaminant transport models in proximity to the Site." *Id.* at 26. Similarly, the USACE had previously suggested that use of a hard bottom in the upper San Jacinto River was a weakness in the Anchor QEA model, but ultimately concluded that this assumption had minimal impact on model results. *Id.* at 27-28.
- USACE also made several comments regarding the definition of the sediment bed as cohesive versus non-cohesive materials and the definition of particle size classes. *Id.* at 29-35. The methodology used by Anchor QEA to classify cohesive sediment, however, has been used for 20 years in numerous modeling studies, many of which were reviewed and approved by USEPA. The criteria used to objectively classify a cohesive sediment bed were developed on a rigorous data analysis of 172 sediment cores, with the results published in the USACE Journal of Hydraulic Engineering in 1995. The approach used by Anchor QEA to define cohesive and non-cohesive grid cells has been successfully applied at over 30 sites during the last 20 years, with USEPA approving this approach.
- The USACE Report identified the "main" limitation of the Anchor QEA model framework to be its use of hydrodynamic and sediment transport models that are not coupled. Computational limitations that flow from coupling the models was the reason, as Respondents explained to USEPA, for the decision not to couple the models. It is worth noting that a similar approach in which the two models are not coupled has been used in modeling performed at numerous other sediment sites. The USACE Report seems to suggest that had the two models been coupled, the result

would have predicted smaller levels of net erosion and higher levels of net deposition. However, the USACE Report did not quantitatively evaluate the effects of using a coupled hydrodynamic and sediment transport model. Therefore, assertions contained in the USACE Report regarding the potential effects of the two models not being coupled are not supported by the USACE Report.

- Similarly, the USACE Report portrayed the use of a 2-D model by Anchor QEA as a weakness in the modeling approach, however, the USACE did not conduct any analysis to demonstrate that a 2-D model was invalid or produced inaccurate results.
- Two differences between LTFATE model used by the USACE and the Anchor QEA sediment transport model are: 1) bedload transport is simulated in LTFATE but not in the Anchor QEA sediment transport model; and 2) the effect of bottom slope on bedload transport and erosion rates is accounted for in LTFATE, but not in the Anchor QEA sediment transport model. Sediment transport modeling studies have been conducted at numerous Superfund sites without including bedload transport. Based on the experience of Anchor QEA, only one Superfund site has incorporated bedload transport into the sediment transport model (i.e., Tittabawassee River, Michigan). In addition, bedload transport is known to be difficult to simulate accurately and the USACE used no data to calibrate or constrain bedload transport in their model. Thus, the inclusion of bedload transport in the USACE sediment transport models adds significant uncertainty to the results that model produces.
- In its model, the USACE assumed a1 centimeter (cm) thick residual layer around the impoundments resulting from removal activities associated with certain remedial alternatives. This 1 cm residual layer thickness is considerably thinner than the 3-inch residual layer thickness assumed in the chemical fate and transport modeling performed for the Draft Final Interim FS, and assumes better implementation of BMPs and fewer losses during construction. Assuming a 1 cm residual layer thickness, the USACE model nonetheless predicted that residual sediments would be transported considerable distances from the impoundments (upstream as far as Grennel Slough and downstream between Lynchburg and Morgan's Point). This finding is generally consistent with the chemical fate and transport model results for Alternative 6. In the Draft Final Interim FS, Anchor QEA attributed this redistribution primarily to releases during construction and subsequent dissolved-phase transport, and not erosion of post-construction residual layer material per se. The Draft Final Interim FS modeling and the modeling performed by the USACE assume different mechanisms that redistribute sediments, but both analyses conclude that Alternative 6N is predicted to result in transport of dioxins and furans over a relatively large area.

- The objective of USACE Task 16 was to "[p]roject the long-term (500 years) effects of the capping alternative (3N) compared to the full removal alternative (6N) on water quality". *Id.* at 146-156. The result from this task is a table (Table 16-9) summarizing and comparing areal flux rates from the capped area with the surrounding un-remediated area for the various alternatives. Areal flux rate is not necessarily the best indicator of water quality. Respondents regard review of differences in predicted water column concentrations between the various alternatives to be a better means of assessing water quality because that is the ultimate exposure pathway to ecological and human receptors, and that is the approach that was adopted in the Draft Final Interim FS [e.g., Figures 4-2 and 4-3]; (Anchor QEA 2014).
- The USACE recovery modeling shows that the flux from the impoundments associated with Alternative 6N with "best practice" backfill placement is much lower (several orders of magnitude) than that from Alternative 3N. This could be misconstrued to indicate an advantage of Alternative 6N with regard to long-term protectiveness. However, it is important to compare these predicted fluxes with the "ambient" flux from the surrounding area within the Preliminary Site Perimeter and outside the impoundment covered by the TCRA armored cap. Such comparisons clearly show that both of these alternatives result in a negligible flux compared to the background flux from the USEPA's preliminary site perimeter, such that there is no advantage of one over the other.

We appreciate all of the detailed work the USACE performed in completing the USACE Report, and are pleased that the results of the USACE's evaluation are consistent with and support the analyses and conclusions drawn in the Draft Final Interim FS.

Thank you for the opportunity to review the USACE Report and please do not hesitate to contact me if you have any concerns, or would like to discuss anything.

Sincerely,

David C. Keith

David C. Keith
Project Coordinator
Anchor QEA, LLC

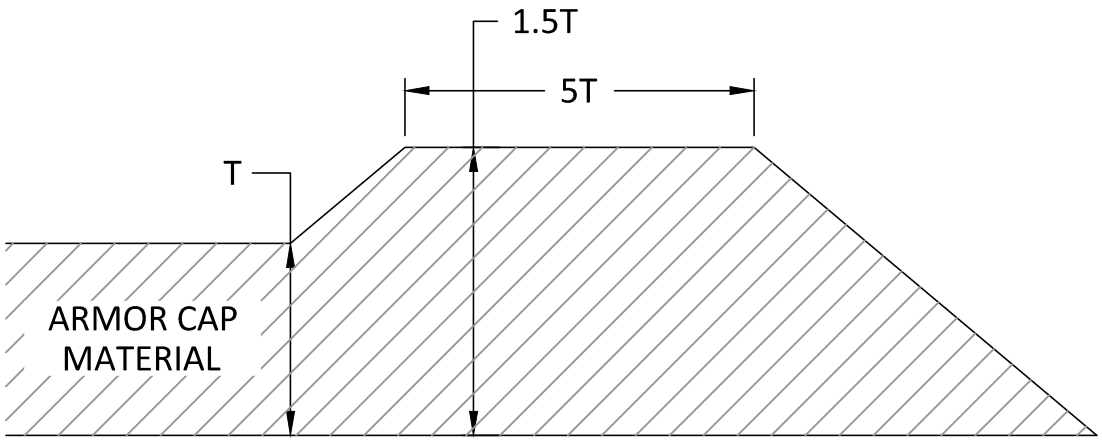
cc: Phil Slowiak, International Paper Company
Dave Moreira, McGinnes Industrial Maintenance Corporation
Jennifer Sampson, Integral Consulting, Inc.

Attachments

Table 1
Summary of FS Residual and Release Modeling Assumptions

Alternative	Alternative Summary	Remedial Technology	BMPs	TCRA Site				Big Star Property		Notes
				Eastern Cell		Western Cell				
				Residuals[1]	Releases	Residuals[1]	Releases	Residuals[1]	Releases	
4N	Remediate portion of TCRA Site containing D/F concentrations in excess of 13,000 ng/kg TEQ	Partial Solidification/Stabilization (S/S) and Capping	● Eastern Cell - S/S using sheetpile to facilitate dewatering ● Western Cell - S/S in the dry	Zero	0.85%	Zero	Zero	---	---	● No simulation of residual/release from western cell since assumed this would be remediated in the dry, and from land. ● Release rate in eastern cell associated with sheetpile wall containment.
5N		Partial Removal and Capping	● Eastern Cell - removal using turbidity curtain ● Western Cell - removal in the dry	Zero	3%	Zero	Zero	---	---	● Zero residuals since alternative assumed to include include backfilling followed by reconstruction of the Armored Cap. ● No simulation of residual/release from western cell since assumed this would be remediated in the dry, and from land. ● Release rate in eastern cell associated with turbidity curtain containment.
5aN	Remediate areas exceeding PCL of 220 ng/kg TEQ in water depths shallower than 10 feet	Partial Removal and Capping	● Eastern Cell - removal using berm or sheetpile ● Western Cell - removal using berm or sheetpile	5%	0.85%	5%	0.85%	---	---	● Release rate associated with earthen berm/sheetpile wall containment around entire remediation area, per USEPA direction. ● Assumed residuals would occur under this alternative since removal in entire area would occur in the wet (includes residuals management through placement of a sand cover).
6N	Remediate areas exceeding PCL of 220 ng/kg TEQ	Full Removal and Residuals Cover	● Eastern Cell - removal using turbidity curtain ● Western Cell - removal using turbidity curtain ● Big Star Property - removal using turbidity curtain	5%	3%	5%	3%	5%	3%	● Assumed residuals would occur under this alternative since removal in entire area would occur in the wet (includes residuals management through placement of a sand cover).

Note:
[1]Value represents the percent of the dredge residual concentration assumed to be in the residual (sand) cover layer.



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C-2

ARMORED CAP WATER EDGE DETAIL

SCALE: NTS

NOTES:
1. THIS EDGE DETAIL SHALL BE APPLIED TO ALL ARMORED CAP EDGES BELOW ELEVATION 0 FEET NAVD 88.

Sep 17, 2015 1:26pm jlaplante K:\Jobs\090557-San Jacinto\090557-01 - San Jacinto\100% plans TCRA\Fig1 Thickened Edge Detail.dwg Fig1

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Figure 1
Armored Cap Edge Detail
San Jacinto River Waste Pits Time Critical Removal Action